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ELECTRIC MACHINE SOURCE OF IMPULSES,(U)
JUL 81 G A SIPAYLOV, A V LOOS
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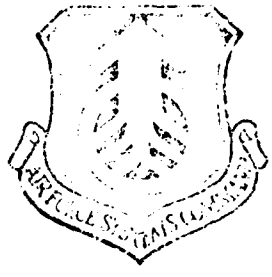
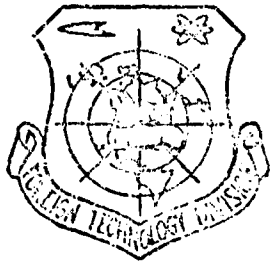


ELECTRIC MACHINE SOURCE OF IMPULSES

by

G. A. Sipaylov and A. V. Loos



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6 ELECTRIC MACHINE SOURCE OF IMPULSES

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh^{-1}
cos	cos	ch	cosh	arc ch	cosh^{-1}
tg	tan	th	tanh	arc th	tanh^{-1}
ctg	cot	cth	coth	arc cth	coth^{-1}
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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Electric Machine Source of Impulses

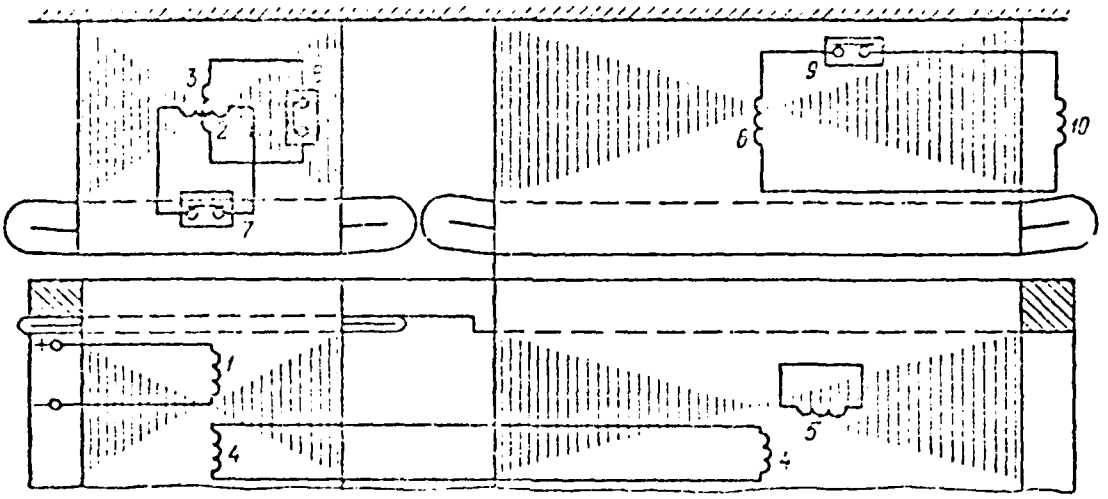
The invention belongs to the electric machine sources of impulse supply that generate single and repeating impulses, used, for example, to create strong magnetic fields, for heating gases by impulse currents, and for other purposes.

The known synchronous impact generators are generally made as nonsynchronous-synchronous machines. In order to produce the greatest possible impact power, before the generator is loaded, the main magnetic flux of the machine is increased by forced excitation. As a consequence of the large time constant for the exciting winding and the strong screening effect of the damping contours of the rotor, however, the increase in the main magnetic flux occurs in a long time reaching tens of periods of e.m.f. of the generator. The increase in the main magnetic flux is accompanied by considerable losses. This causes a reduction in the kinetic energy reserve of the machine rotor. The screening effect of the damper winding also limits the production of magnetic fluxes that are considerable in quantity directly before the machine is loaded. All of this significantly limits the impact power of the known synchronous generators.

In order to increase the impact power of the generator, the exciting winding is placed on the rotating part of the auxiliary magnetic drive. Two windings are placed on the fixed part of the magnetic drive. They are shifted in relation to each other by 90°. Here the damping winding of the rotor is common for the two magnetic drives. The distributed phase winding of the main magnetic drive is excited by

currents in the generator damping winding that develop during shorting of each of the stator windings of the auxiliary magnetic drive in sequence in time, at moments when its penetrating flux equals zero.

The drawing shows the electric schematic for the impact synchronous generator where 1 is the exciting winding on the auxiliary magnetic



drive, 2 and 3 are the windings on the fixed part of the auxiliary magnetic drive that are shifted in relation to each other by 90°, 4 and 5 are the damping windings, 6 is the phase winding on the fixed part of the main magnetic drive, and 7-9 are the commutating equipment.

Phase winding 6 is connected to load 10 through the commutating equipment.

In the initial state, the contacts of the commutating equipment 7-9 are open. Excitation voltage is fed to the exciting winding 1 and the generator rotor turns with rated velocity. Electromotive force that is shifted by 90° in phase is induced in windings 2 and 3. The currents in the damping windings 4 and 5 of the generator equal zero and there is no e.m.f. on winding 6. The generator idles with slight losses equal to the idling losses in the auxiliary magnetic drive.

At the moment in time when the flux penetrating winding 2 equals zero, and its e.m.f. is the maximum, the commutating equipment 7 is shorted. At this moment in time, the axis of winding 2 and the

longitudinal axis of the rotor are perpendicular. During the subsequent turn of the rotor by 90°, their axes coincide and the flux created by the exciting winding tries to penetrate the loop of winding 2. However, a current develops in this winding which tries to preserve the value of the flux coupled to it equal to zero. This current causes the appearance in the rotor windings 1 and 4 of a current whose size is inversely proportional to their scattering resistances. Since scattering resistance of exciting winding 1 is considerably greater than the scattering resistance of damping winding 4, then the flash-up of current practically develops only in the damping winding. At the moment of coincidence of the winding axis 2 and the longitudinal axis of the rotor, it reaches the maximum value.

At the moment in time when the winding axes 3 and the longitudinal axis of the rotor are perpendicular, while the flux that penetrates this winding equals zero, the commutating apparatus 8 is shorted. In this case, there is a symmetrical short-circuited system of windings 2 and 3 on the stator which, with further rotation of the rotor, guarantees a constant current in the damping winding 4 (without consideration for the active resistances). The current in the damping winding creates the main magnetic flux in the main magnetic drive, and an electromotive force appears at the outlet winding 6. The time for establishing it equals the time for increase in the current in damping winding 4. It is one-fourth of the e.m.f. period.

At the moment the next e.m.f. half-wave starts, the generator is loaded by closing the commutating equipment 9. After the end of the current impulse in the load, the commutating equipment 9 is opened. Then in time sequence, at the moments of transition of the currents in windings 2 and 3 through zero, the commutating equipment 7 and 8 is opened. The generator again idles.

Subject of Invention

The electric machine impulse source that contains a synchronous generator with exciting winding of direct current and damping winding on a rotor, with distributed phase winding of the armature on the fixed part of the main magnetic drive, connected to the load through

the commutating apparatus is distinguished by the fact that in order to increase the impact power, the exciting winding is placed on the rotating part of the auxiliary magnetic drive. Two windings that are shifted by 90° and are short-circuited by the commutating apparatus are placed on the fixed part of the magnetic drive. At the same time, the damping winding of the rotor is common for the two magnetic drives.

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